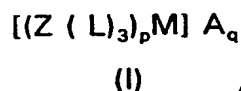


CLAIMS

1. Light emitting device comprising a complex containing a lanthanide metal cation complexed with from one to three polydentate ligands, wherein each ligand comprises one or more pyrazolyl groups, optionally substituted and optionally fused with a substituted or unsubstituted, heterocyclic or carbocyclic, aromatic or non-aromatic, ring system, one of the nitrogen atoms of the pyrazolyl groups forming a coordinate bond to the metal.

2. Device as claimed in claim 1, wherein the ligands are trispyrazolylborate anions, the pyrazolyl groups being optionally substituted and optionally fused with a substituted or unsubstituted, heterocyclic or carbocyclic, aromatic or non-aromatic, ring system, optionally substituted at the boron atom.

3. Device as claimed in claim 1 or claim 2, wherein the complex has the formula (I):



wherein Z is a carbon atom or R<sup>1</sup> - B fragment

p is 1, 2 or 3

q is 3-p and

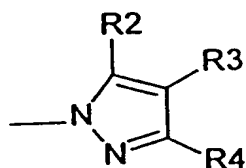
A is a counterion

R<sup>1</sup> is: (i) hydrogen, aryl or aralkyl each optionally substituted with from one to five halogen or C<sub>1</sub> to C<sub>6</sub> alkyl groups; or (ii) C<sub>1</sub> to C<sub>6</sub> alkyl, C<sub>1</sub> to C<sub>6</sub> alkenyl or C<sub>1</sub> to C<sub>6</sub>

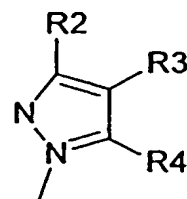
0090E0"0505460

alkynyl each optionally substituted with one or more halogen atoms

each L is covalently bound to Z and is independently selected from a group of the formula (II) or (III)



(II)



(III)

or

in which R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are independently selected from: (i) halogen, cyano, nitro, sulphonyl, amino, C<sub>1</sub> to C<sub>6</sub> alkylamino, C<sub>1</sub> to C<sub>6</sub> alkylamido, carboxyl, C<sub>1</sub> to C<sub>6</sub> alkoxycarbonyl, hydroxy, C<sub>1</sub> to C<sub>6</sub> alkoxy, C<sub>1</sub> to C<sub>6</sub> alkylcarbonyloxy, C<sub>1</sub> to C<sub>6</sub> alkylcarbonyl, C<sub>1</sub> to C<sub>6</sub> haloalkoxy and hydrogen; (ii) aryl or aralkyl each optionally substituted on the aryl ring or, for aralkyl, on the alkylene chain with from one or more of the groups mentioned under (i) above; and (iii) C<sub>1</sub> to C<sub>6</sub> alkyl, C<sub>1</sub> to C<sub>6</sub> alkenyl or C<sub>1</sub> to C<sub>6</sub> alkynyl each optionally substituted with one or more of the groups mentioned under (i) and (ii) above

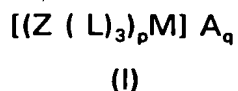
0030E0 05054460

or either  $R^2$  and  $R^3$  or  $R^3$  and  $R^4$  are linked so as to form a fused aromatic or non-aromatic, ring system with the pyrazolyl ring of L

and M is a trivalent lanthanide metal ion.

4. Device as claimed in ~~any one of claims 1 to 3~~, wherein M is Tb, Ce, Eu, Er, Gd, Tm, Sm or Nd.
5. Device as claimed in ~~any one of claims 1 to 4~~, wherein  $R^4$  and/or  $R^2$  is  $-(CX_2)_nX$ , wherein n is 0 or a positive integer from 1 to 6 and X is halogen, or orthohalogenated or orthodiperhalomethylated aryl.
6. Device as claimed in claim 5, wherein  $R^4$  and/or  $R^2$  is trifluoromethyl.
7. Device as claimed in ~~any one of claims 1 to 6~~, wherein  $R^3$  is hydrogen and  $R^4$  and/or  $R^2$  is trifluoromethyl.
8. Device as claimed in ~~any one of claims 1 to 7~~, wherein Z is H-B.
9. Device as claimed in ~~any one of claims 1 to 8~~, wherein the complex is positively charged and is derived from a compound containing  $CF_3SO_3^-$ , halide, nitrate or perchlorate as the counterion.
10. Device as claimed in ~~any one of claims 1 to 9~~ which is a flat panel display.

11. Organometallic complex having the formula (I)



wherein Z, p, R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, L, A, q and M are as defined in claim 3 and:

R<sup>4</sup> and/or R<sup>2</sup> is -(CX<sub>2</sub>)<sub>n</sub>X wherein n is 0 or a positive integer from 1 to 6 and X is halogen; or R<sup>4</sup> is orthodihalogenated or orthodiperhalomethylated aryl, optionally further substituted on the aryl ring; or

R<sup>2</sup> and R<sup>3</sup> or R<sup>3</sup> and R<sup>4</sup> are linked so as to form a fused aromatic or non-aromatic ring system with the pyrazolyl ring of L.

12. Complex as claimed in claim 11, wherein M is Tb, Ce, Eu, Er, Gd, Tm, Sm or Nd.

13. Complex as claimed in claim 11 ~~or claim 12~~, wherein R<sup>4</sup> is trifluoromethyl.

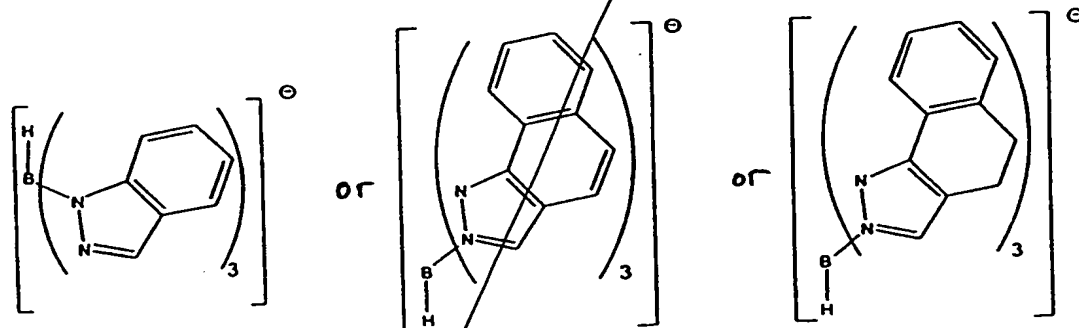
14. Complex as claimed in ~~any one of claims 11 to 13~~, wherein R<sup>3</sup> is hydrogen and R<sup>2</sup> is trifluoromethyl.

15. Complex as claimed in ~~any one of claims 11 to 14~~, wherein Z is H-B.

0090E0"05054460

7  
A  
A

16. Complex as claimed in claim 11, wherein  $ZL_3$  is



17. Complex as claimed in ~~any one of claims 11 to 16~~, wherein A is  $CF_3SO_3^-$ , halide, nitrate or perchlorate.

18. Process for producing the complex of ~~any one of claims 11 to 17~~ comprising the steps of reacting  $M^{3+}$  ions with  $ZL_3^-$  ions in solution and separating the complex from the reaction mixture.

19. Process as claimed in claim 18, wherein the complex is separated from the reaction mixture by solvent extraction.

20. Process as claimed in claim 18 ~~or claim 19~~ which is carried out under substantially anhydrous conditions.

009000 05054460

11 05 05 99

21. Light emitting material comprising an organometallic complex either as a film or dispersed within a matrix, the organometallic complex being a complex according to claim 11, wherein the ligands are optionally fluorinated and are arranged about the metal such that there are no carbon-hydrogen bonds within 5Å of the metal centre.

22. Light emitting material as claimed in claim 21, wherein the ligands are tridentate and there are two ligands per metal ion in the complex.

23. Light emitting material as claimed in ~~either claim 21 or claim 22~~, wherein the complex is a complex according to ~~any one of~~ claims 12 to 17.

A  
A  
A

009000 05050500

A  
B  
1